

# SIHI<sup>LPH-X</sup> - Liquid Ring Vacuum Pump

Two Stage



LPH 45008, LPH 45311, LPH 45316

**Pressure Range:** 33 to 1013 mbar

**Suction Volume:** 55 to 258 m<sup>3</sup>/h

## CONSTRUCTION

Sterling SIHI liquid ring vacuum pumps have a simple but robust construction with the following features and benefits:

- Near isothermal compression
- Oil free, with no internal lubrication
- Capable of handling almost all gases and vapours
- Able to handle quantities of liquid "carry over"
- Low maintenance and safe operation
- Low noise and almost vibration free
- Available in a wide range of materials
- Broad range of applications
- O-ring sealing as standard
- Cavitation protection as standard
- Drain hole as standard
- Built-in solids drain
- Rotating metallic parts are non contacting to minimise wear
- ATEX compliance



Sterling SIHI liquid ring vacuum pumps of the range LPH 45008, LPH 45311 and LPH 45316 are two stage pumps. In addition, the LPH 45008 and LPH 45316 can be used as compressors without any modification. (see the Technical Catalogue - Liquid Ring Compressors)

## APPLICATIONS

Evacuation and pumping of dry gases and saturated vapours. The pumps can also handle liquids. These units offer pressures in the range of 33...900 mbar(a) to atmospheric. Much lower pressures are available by using ancillaries such as ejectors and lobular boosting pumps. Typical application areas include:

- Chemical and pharmaceutical industry for distillation, drying and degassing
- Food and beverage industry for low temperature cooking, and bottle filling
- Electronic industry for impregnation and drying
- Plastics & Rubber industry for degassing
- Healthcare for sterilisers and general vacuum

## NOTE

By continuously feeding the pump with a small amount of service liquid (usually water), the heat due to gas/vapour compression is conducted away. This also replenishes the liquid ring and ensures that it does not become saturated with process media. Recharging the pump with service liquid at ambient temperature enables the unit to condense evacuated gases / vapours. It can therefore be used for solvent recovery. The condensed gas and liquid can be separated in a liquid separator. More information is provided in the accessory catalogues.

The integrated solids drain permits the removal of any entrained solids whilst the pump is operating. The service liquid can therefore, simply be re-circulated. The rotation of the pump is clockwise when viewed from the drive end.

## GENERAL TECHNICAL DATA

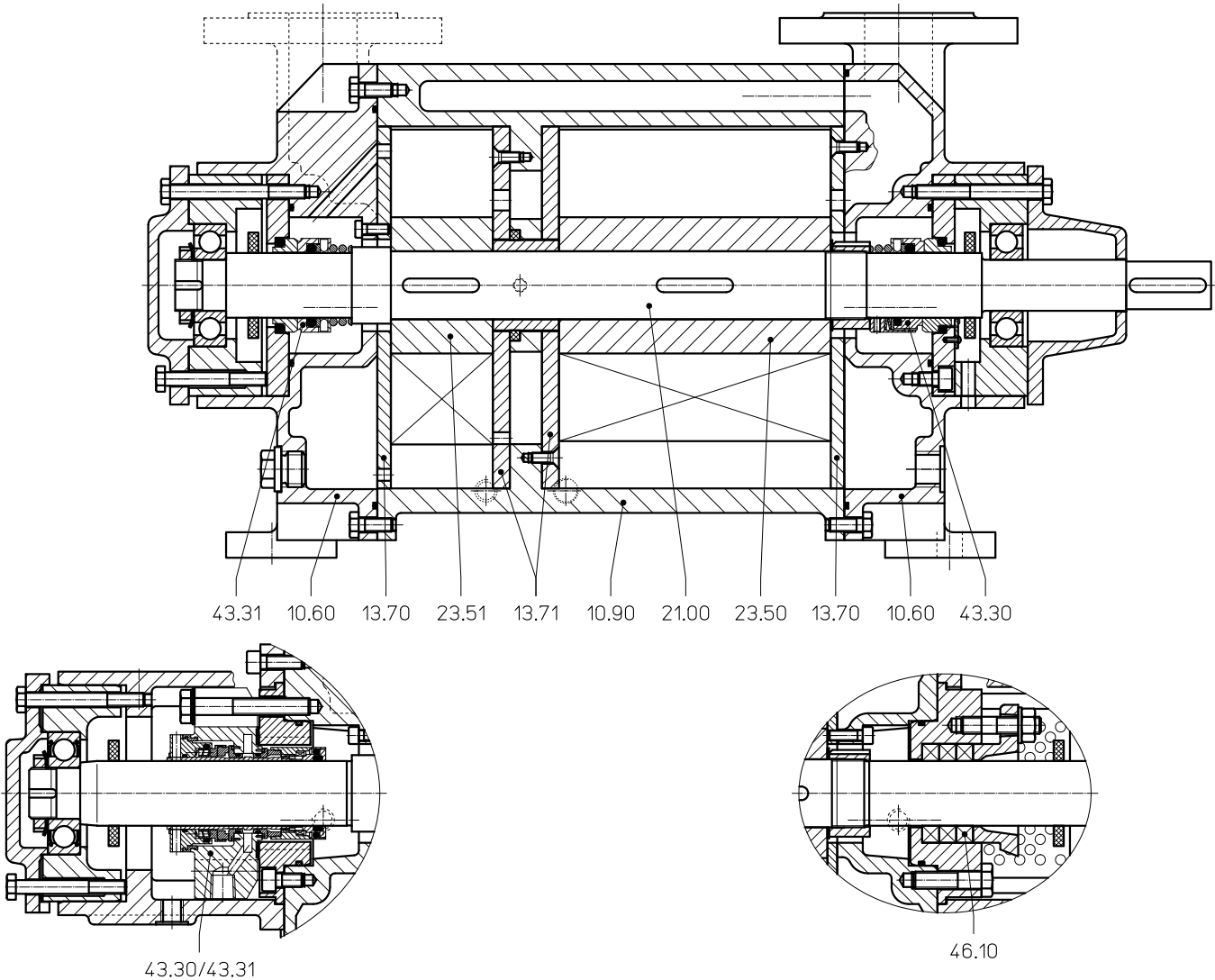
Pump Type	Units	LPH 45008	LPH 45311	LPH 45316
Speed	50 Hz 60 Hz	rpm		1450 1740
Maximum overpressure on compression	bar	1.5		
Maximum permissible pressure difference	bar	1.5	1.5	1.2
Hydraulic test pressure (Overpressure)	bar	3.0		
Moment of inertia of rotating parts of pump and water content	kg · m <sup>2</sup>	0.05	0.063	0.09
Noise level at 80 mbar suction pressure	dB (A)	65		
Minimum permissible pulley diameter for V belt drive	mm	160		
Max. gas temperature:	dry saturated	°C		120 100
Service liquid:				
Maximum permissible temperature	°C	100		
Maximum viscosity	mm <sup>2</sup> /s	90		
Maximum density	kg/m <sup>3</sup>	1200		
Liquid capacity up to middle of shaft	litre	4.0	5.5	7.0
Maximum flow resistance of the heat exchanger	bar	0.2		

In selecting a pump, avoid choosing one which is likely to be operating at a combination of its maximum permissible limits e.g. maximum viscosity and maximum permissible pressure difference.

**Materials LPH 45008, LPH 45311, LPH 45316 with single, double mechanical seal and gland packing**

Position Number	COMPONENT	MATERIALS				
		0A	0B	0K	SZ	4B
10.60	Casing	0.6025				1.4408
10.90	Central Body	0.6025				1.4408
13.70, 13.71	Guide Disc	0.6025			1.4404	
23.50, 23.51	Impeller	2.1096.01	1.0619	1.4301	1.4517	
21.00	Shaft	1.4021				1.4404
43.30, 43.31	Mechanical Seal, Type SIHI FK (AG•)	Cr-Steel / Carbon / Butadiene rubber				Cr Ni Mo-Steel / Carbon / Viton
43.30, 43.31	Mechanical Seal, Type Sterling GNZ (AF•)	SiC / Carbon / Viton				SiC / Carbon / Teflon
43.30, 43.31	Double Mechanical Seal	on request				
46.10	Gland Packing	GORE	-			

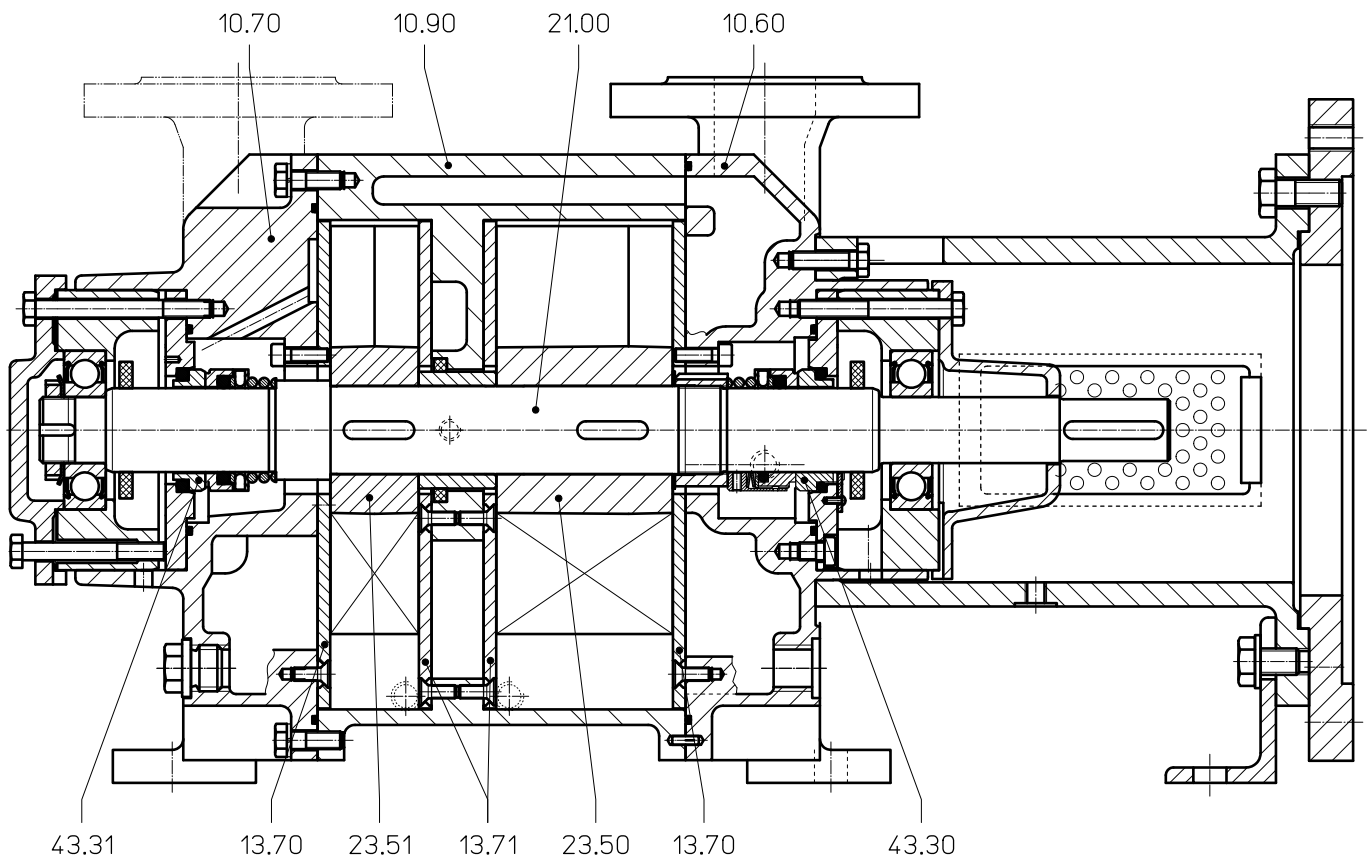
**Cut-away diagram LPH 45008, LPH 45311, LPH 45316 with single, double mechanical seal and gland packing**



## Materials LPH 45008, LPH 45311, LPH 45316 with motor carrier

Position Number	COMPONENT	MATERIALS	
		0A	4B
10.60, 10.70	Casing	0.6025	1.4408
10.90	Central Body		
13.70, 13.71	Guide Disc		
23.50, 23.51	Impeller	2.1096.01	1.4517
21.00	Shaft	1.4021	1.4404
43.30, 43.31	Mechanical Seal, Type SIHI FK (AG●)	Cr-Steel / Carbon / Butadiene rubber	Cr Ni Mo-Steel / Carbon / Viton
43.30, 43.31	Mechanical Seal, Type Sterling GNZ (AF●)	SiC / Carbon / Viton	SiC / Carbon / Teflon

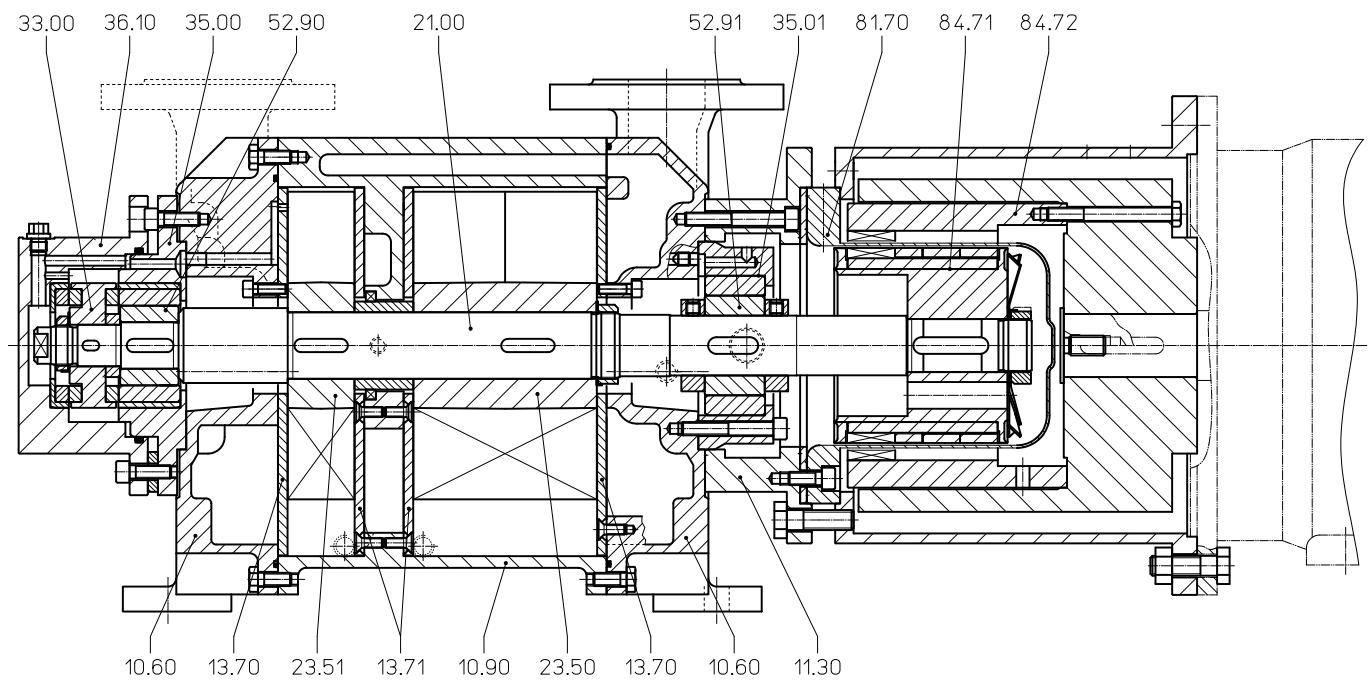
## Cut-away diagram LPH 45008, LPH 45311, LPH 45316 with motor carrier



## Materials LPH 45008, LPH 45311, LPH 45316 with magnetic coupling

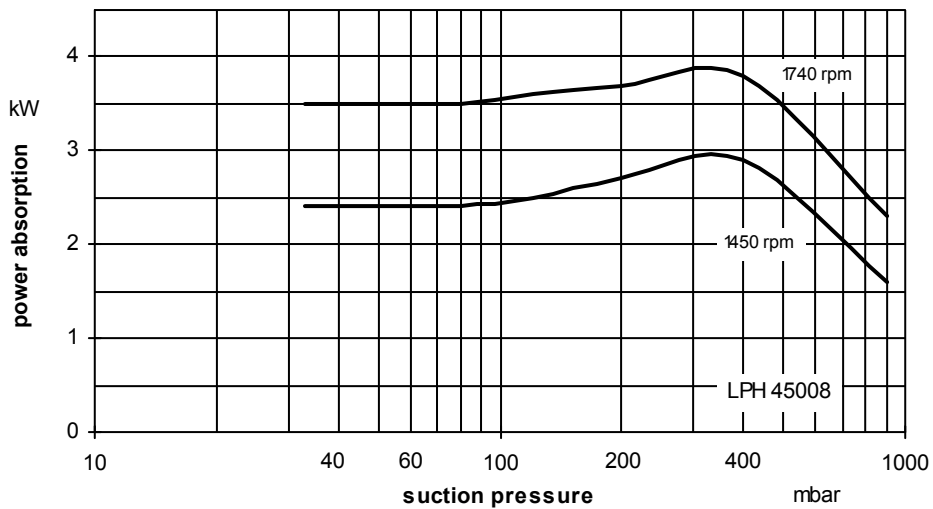
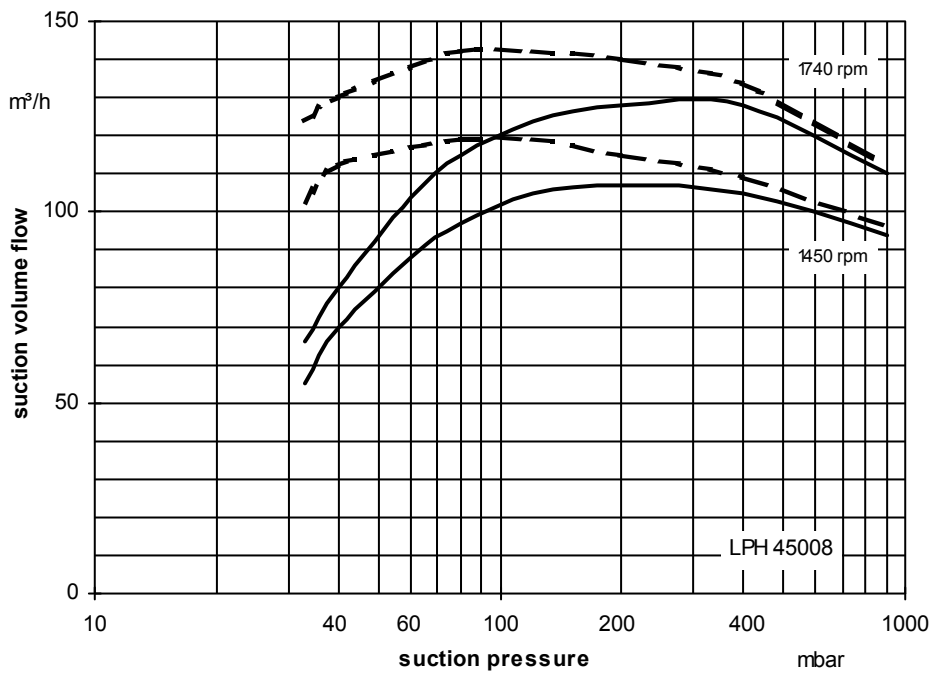
Position Number	COMPONENT	MATERIALS	
		0B	4B
10.60	Casing	0.6025	1.4408
10.90	Central body		
13.70, 13.71	Guide disc		
11.30	Intermediate casing	1.0553	1.4571
21.00	Shaft	1.4021	
23.50, 23.51	Vane wheel impeller	1.0619	1.4517
33.00	Thrust bearing	1.4462 / silicon carbide	
35.00, 35.01	Bearing housing	1.0553 / silicon carbide	1.4571 / silicon carbide
36.10	Bearing cover		
52.90, 52.91	Bushing	tungsten carbide	
81.70	Isolation shroud	1.4571 / 2.4610	
84.71	Inner magnet	1.4571 / 2.4610 / Magnet	
84.72	Outer magnet	1.0553 / Magnet	

## Cut-away diagram LPH 45008, LPH 45311, LPH 45316 with magnetic coupling



All information in this catalogue, like general technical data, performance data, dimensions, arrangement drawings, accessories, etc. don't refer to the magnetic coupling execution.  
Please contact the manufacturer about more information.

Performance Characteristics LPH 45008



The operating data is valid under the following conditions:

- Process media:
  - dry air: 20°C —————
  - steam saturated air: 20°C - - - - -
- Service liquid:
  - water: 15°C

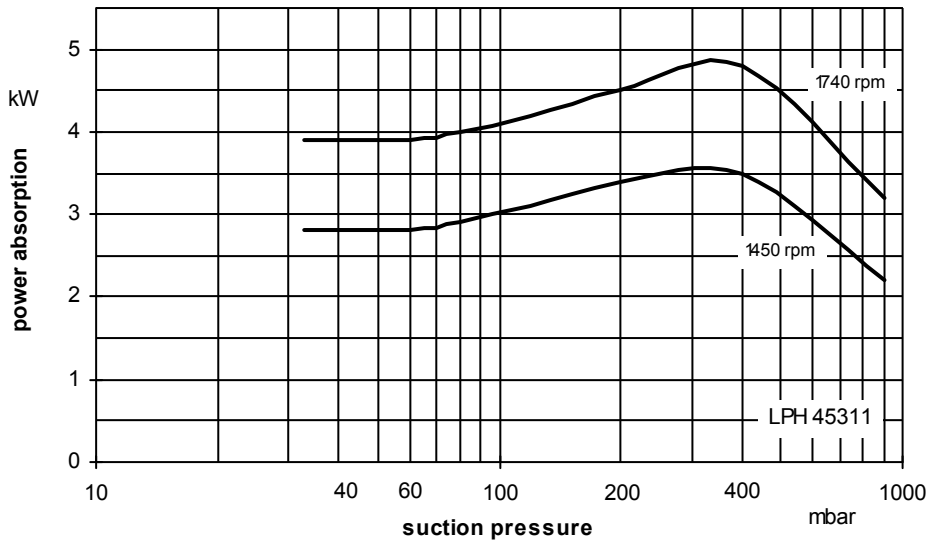
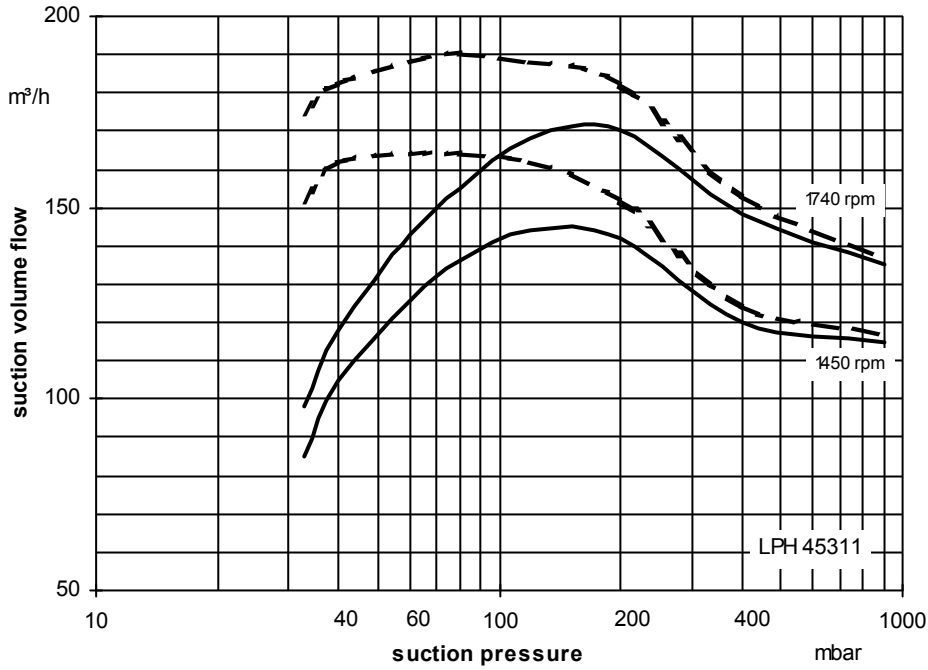
Pressure of gas to be evacuated: 1013 mbar (Atmospheric pressure)

The suction volume is related to the suction pressure

Tolerance on operating data is 10%

The maximum consumption of make up water occurs at the lowest suction pressure

## Performance Characteristics LPH 45311



The operating data is valid under the following conditions:

- Process media:
  - dry air: 20°C —————
  - steam saturated air: 20°C - - - - -
- Service liquid:
  - water: 15°C

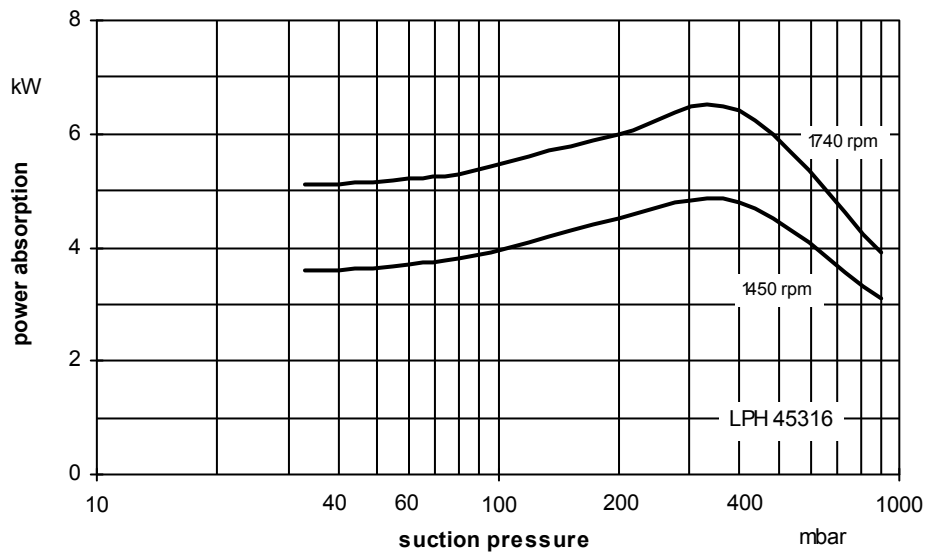
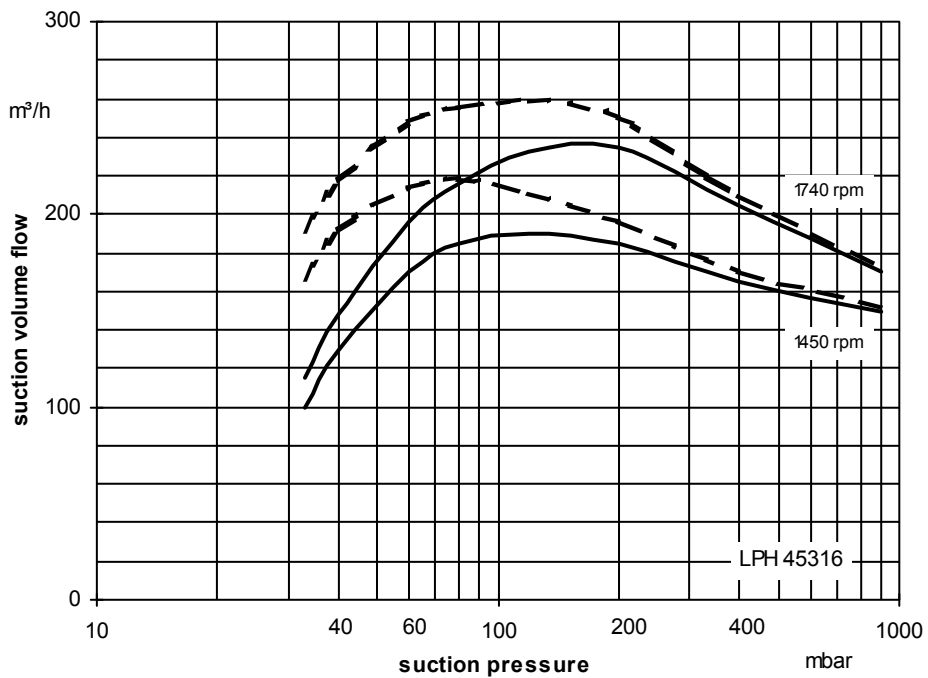
Pressure of gas to be evacuated: 1013 mbar (Atmospheric pressure)

The suction volume is related to the suction pressure

Tolerance on operating data is 10%

Maximum consumption of make up water occurs at the lowest suction pressure

Performance Characteristics LPH 45316



The operating data is valid under the following conditions:

- Process media:
  - dry air: 20°C \_\_\_\_\_
  - steam saturated air: 20°C - - - - -
- Service liquid:
  - water: 15°C

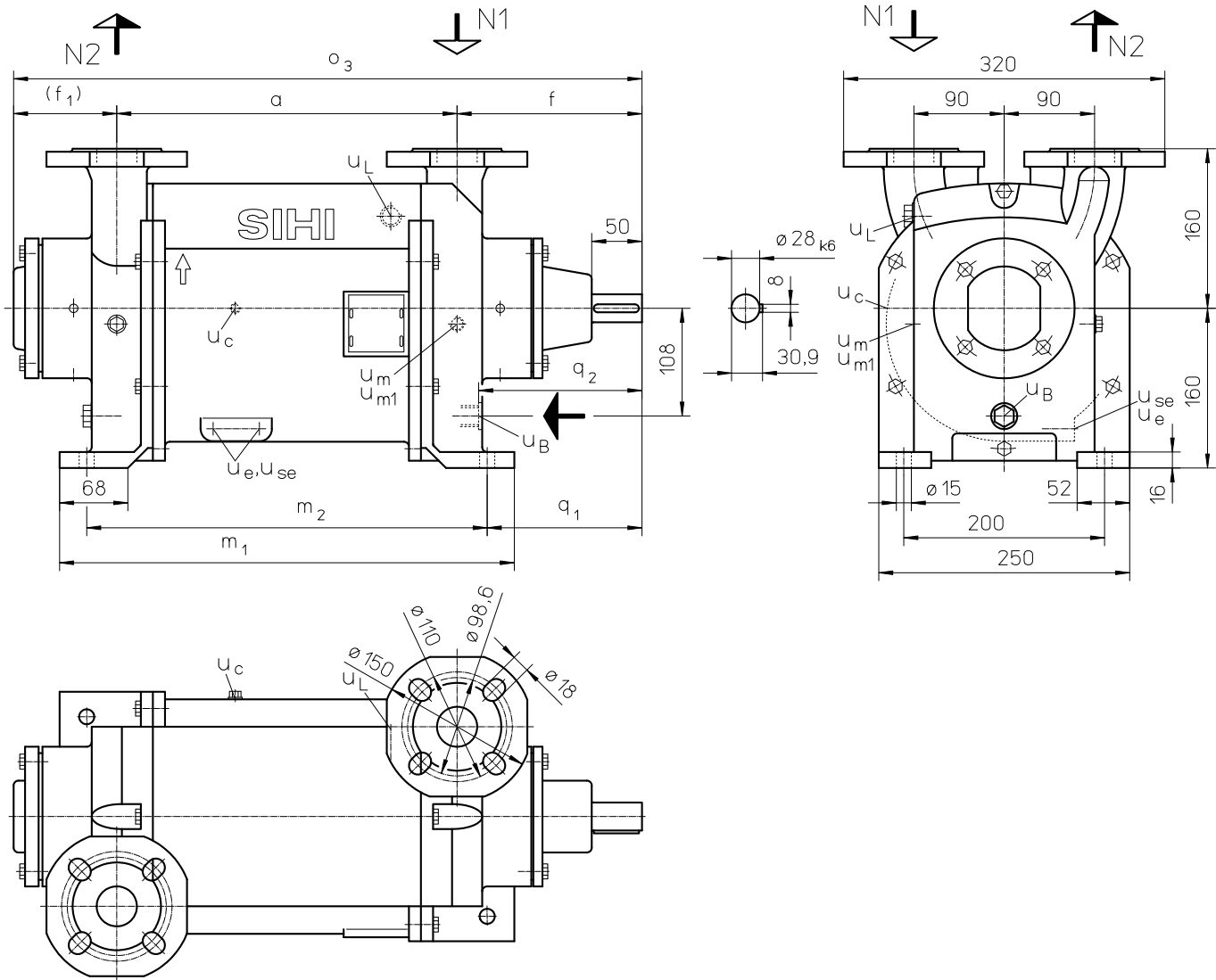
Pressure of gas to be evacuated: 1013 mbar (Atmospheric pressure)

The suction volume is related to the suction pressure

Tolerance on operating data is 10%

Maximum consumption of make up water occurs at the lowest suction pressure

## Dimensions LPH 45008, LPH 45311, LPH 45316 with single mechanical seal and gland packing



N 1 = Gas-Inlet DN 40

N 2 = Gas-Outlet DN 40

$U_B$  = connection for service liquid G  $1/2$

$U_c$  = connection for cavitation protection G  $1/8$

$U_e$  = connection for drain G  $1/8$

$U_{se}$  = connection for dirt drain G  $1/8$

$U_L$  = connection for air cock G  $1/2$

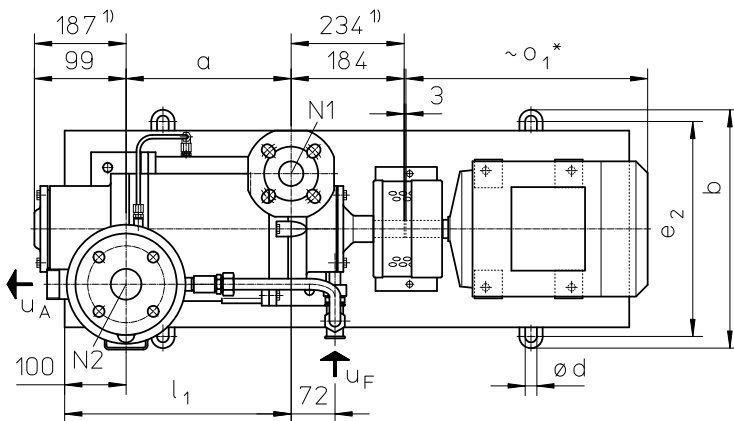
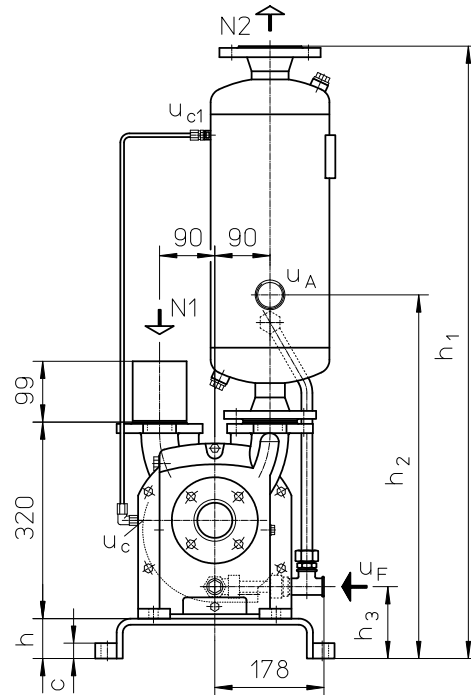
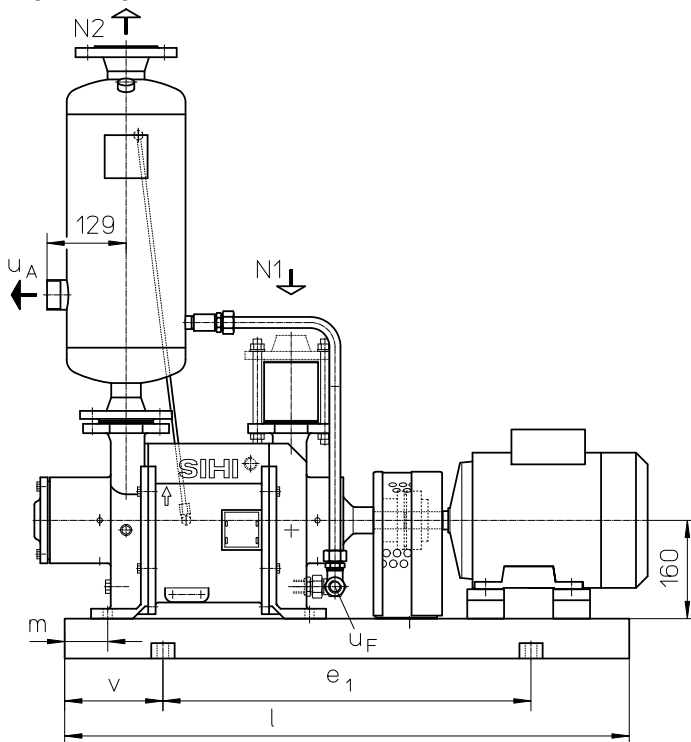
$U_m$  = connection for pressure gauge G  $1/4$

$U_{m1}$  = connection for drainage valve or liquid level sensor G  $1/4$

	execution	a [mm]	f [mm]	$f_1$ [mm]	$m_1$ [mm]	$m_2$ [mm]	$o_3$ [mm]	$q_1$ [mm]	$q_2$ [mm]	approx. weight [kg]
LPH 45008	Mechanical Seal	239	184	103	353	299	526	154	163	68
	Gland Packing		234	187				204	212	77
LPH 45311	Mechanical Seal	269	184	103	383	329	556	154	163	72
	Gland Packing		234	187				204	212	81
LPH 45316	Mechanical Seal	339	184	103	453	399	626	154	163	79
	Gland Packing		234	187				204	212	88



## LPH 45008, LPH 45311, LPH 45316 with single mechanical seal, gland packing and with Top-Mounted Liquid Separator



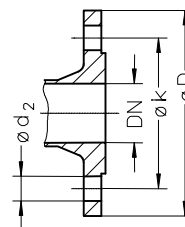
- N 1 = Gas-Inlet DN 40
- N 2 = Gas-Outlet DN 50
- u<sub>A</sub> = Liquid Drain G 1 for LPH 45008, G 1½ for LPH 45311 and 45316
- u<sub>F</sub> = Connection for Make-Up Liquid G 1½
- u<sub>c</sub> = Connection for Cavitation Protection G 1/8
- u<sub>c1</sub> = Connection for Cavitation Protection G 1/8

	E-Motor 50 Hz			Base-plate	a [mm]	b [mm]	c [mm]	d [mm]	e <sub>1</sub> [mm]	e <sub>2</sub> [mm]	h [mm]	h <sub>1</sub> [mm]	h <sub>2</sub> [mm]	h <sub>3</sub> [mm]	l [mm]	l <sub>1</sub> [mm]	m [mm]	o <sub>1</sub> * [mm]	v [mm]	Approx. Weight [kg]
	Size	IP 55	kW																	
LPH 45008	100 L	3.0	-	S303	239	390	25	19	600	350	65	877	592	117	920	339	70	375	160	140
	112 M	-	3.6																	150
LPH 45311	112 M	4.0	-	S344	269	450	30	24	660	400	80	997	607	132	1020	369	40	455	180	205
	132 S	-	5.0																	200
LPH 45316	132 S	5.5	-	S344	339	450	30	24	660	400	80	1012	607	132	1020	439	40	495	180	200
	132 M	-	6.8																	235

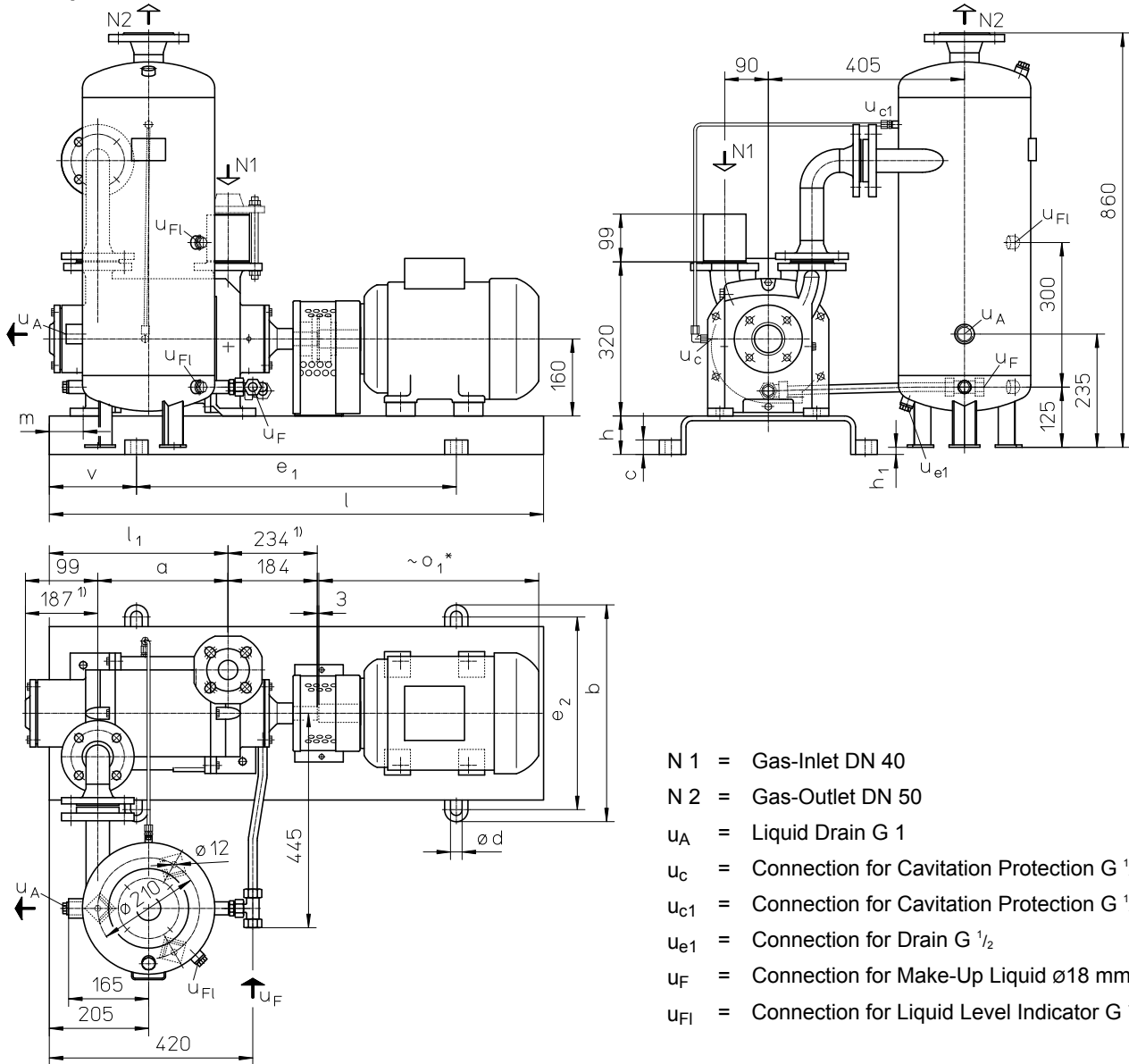
\* Dimensions dependent upon motor supplier

1) Execution with gland packing

Flange dimensions according to DIN 2501 PN 10 [mm]		
DN	40	50
k	110	125
D	150	165
Number x d <sub>2</sub>	4 x 18	4 x 18



## LPH 45008, LPH 45311, LPH 45316 with single mechanical seal, gland packing and with Side-Mounted Liquid Separator

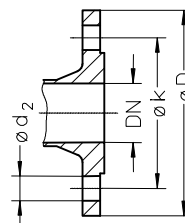


	E-Motor 50 Hz			Base-plate	a [mm]	b [mm]	c [mm]	d [mm]	e <sub>1</sub> [mm]	e <sub>2</sub> [mm]	h [mm]	h <sub>1</sub> [mm]	l [mm]	l <sub>1</sub> [mm]	m [mm]	o <sub>1</sub> * [mm]	v [mm]	Approx. Weight [kg]
	Size	IP 55	kW EEx e II T3															
LPH 45008	100 L	3.0	-	S303	239	390	25	19	600	350	65	0	920	339	70	375	160	
	112 M	-	3.6															
LPH 45311	112 M	4.0	-	S344	269	450	30	24	660	400	80	15	1020	369	40	455	180	
	132 S	-	5.0															
LPH 45316	132 S	5.5	-	S344	339	450	30	24	660	400	80	15	1020	439	40	495	180	
	132 M	-	6.8															

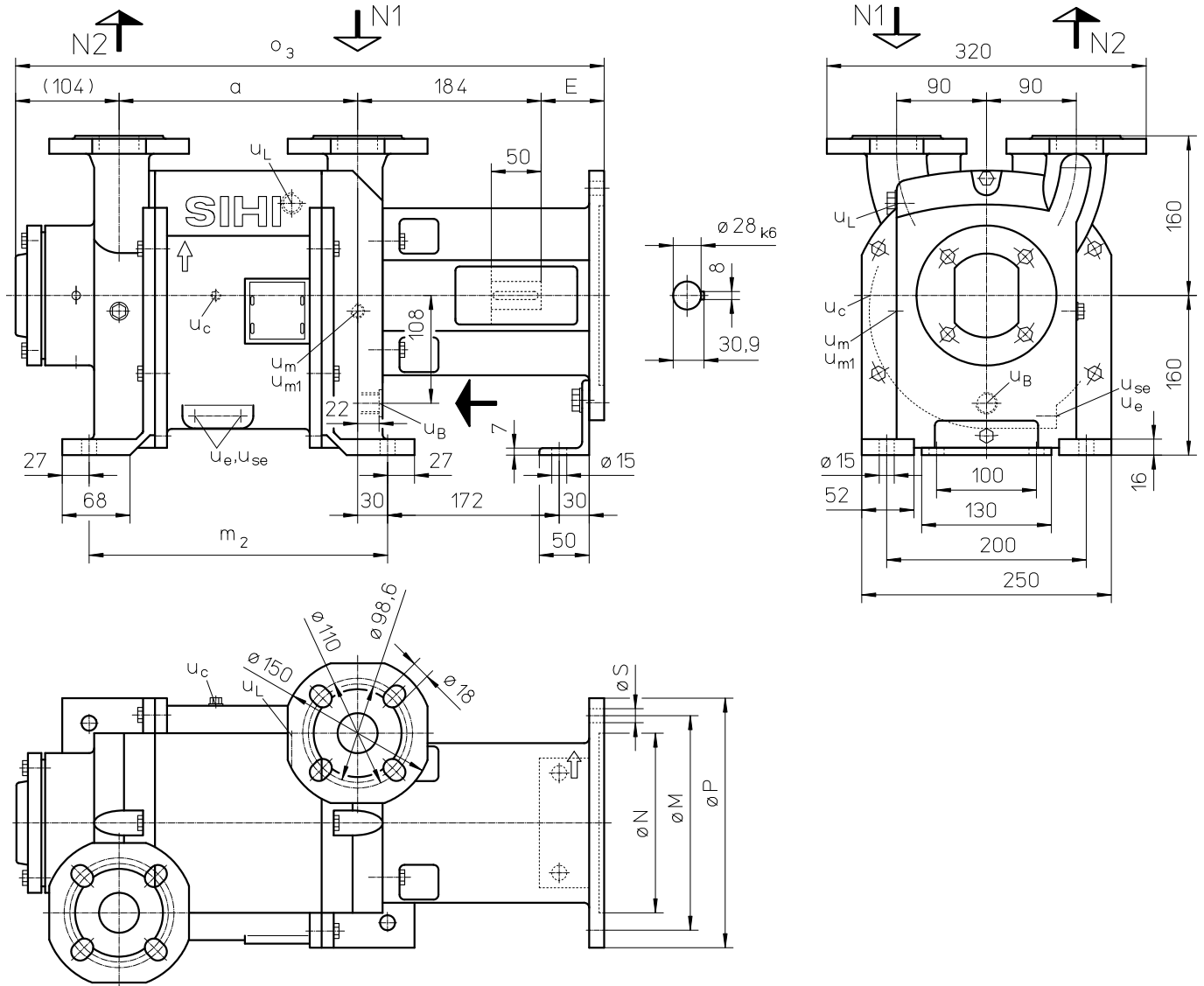
\* Dimensions dependent upon motor supplier

<sup>1)</sup> Execution with gland packing

Flange dimensions according to DIN 2501 PN 10 [mm]		
DN	40	50
k	110	125
D	150	165
Number x d <sub>2</sub>	4 x 18	4 x 18



## Dimensions LPH 45008, LPH 45311, LPH 45316 with motor carrier



N 1 = Gas-Inlet DN 40

N 2 = Gas-Outlet DN 20

u<sub>B</sub> = connection for service liquid G 1/2

u<sub>c</sub> = connection for cavitation protection G 1/8

u<sub>e</sub> = connection for drain G 1/8

u<sub>se</sub> = connection for dirt drain G 1/8

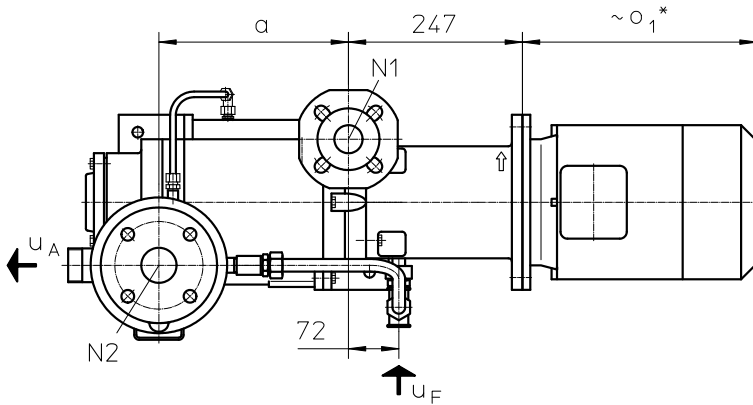
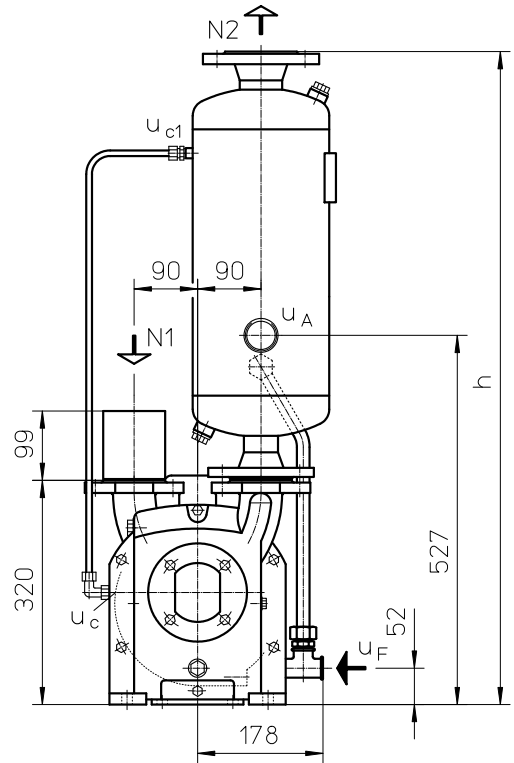
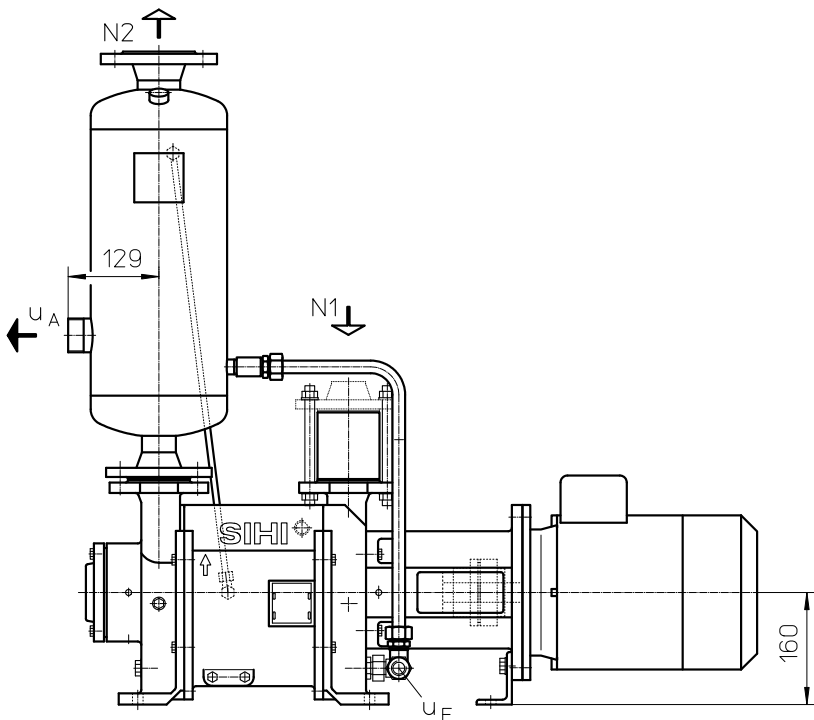
u<sub>L</sub> = connection for air cock G 1/2

u<sub>m</sub> = connection for pressure gauge G 1/4

u<sub>m1</sub> = connection for drainage valve or liquid level sensor G 1/4

	code	for motor size	a [mm]	m <sub>2</sub> [mm]	o <sub>3</sub> [mm]	E [mm]	M [mm]	N [mm]	P [mm]	S [mm]	approx. weight [kg]
LPH 45008	LS	100L / 112M	239	299	590	63	215	180	250	4 x Ø14	79
LPH 45311	LS	112 M	269	329	620						83
	MS	132 S/M			640	90					
LPH 45316	MS	132 S/M	339	399	710	83	265	230	300	4 x M12	97

## LPH 45008, LPH 45311, LPH 45316 with motor carrier and with Top-Mounted Liquid Separator

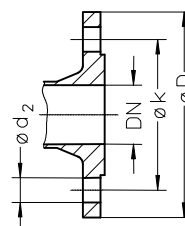


- N 1 = Gas-Inlet DN 40
- N 2 = Gas-Outlet DN 50
- U<sub>A</sub> = Liquid Drain G 1 for LPH 45008,  
G 1½ for LPH 45311 and 45316
- U<sub>F</sub> = Connection for Make-Up Liquid G ½
- U<sub>c</sub> = Connection for Cavitation Protection G ⅛
- U<sub>c1</sub> = Connection for Cavitation Protection G ⅛

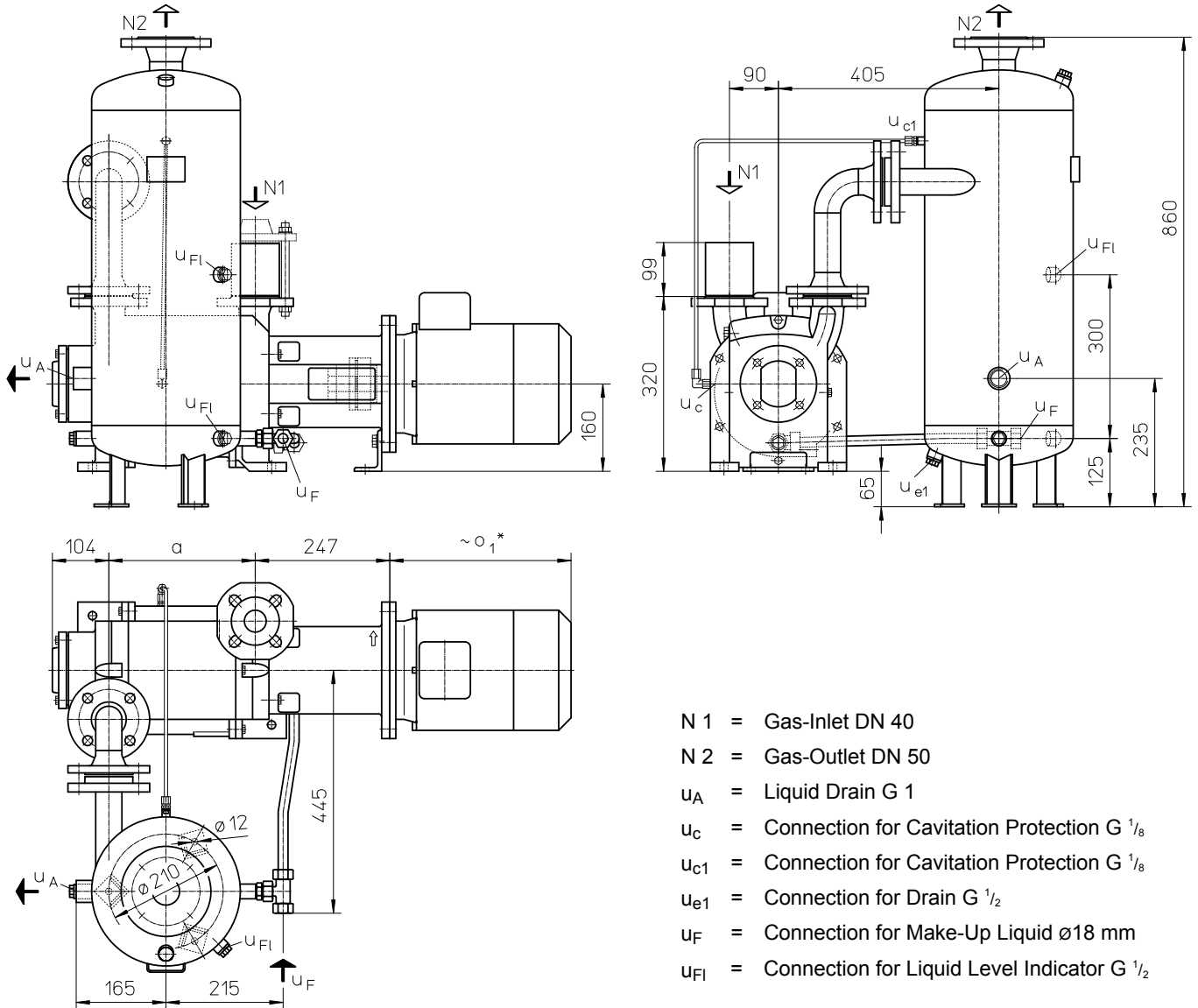
	E-Motor 50 Hz			a [mm]	h [mm]	o <sub>1</sub> * [mm]	Approx. Weight [kg]
	Size	IP 55	EEx e II T3				
LPH 45008	100 L	3,0	-	239	812	312	118
	112 M	-	3,6				128
LPH 45311	112 M	4,0	-	269	932	333	133
	132 S	-	5,0				178
LPH 45316	132 S	5,5	-	339		373	165
	132 M	-	6,8				200

\* Dimensions dependent upon motor supplier

Flange dimensions according to DIN 2501 PN 10 [mm]		
DN	40	50
k	110	125
D	150	165
Number x d <sub>2</sub>	4 x 18	4 x 18



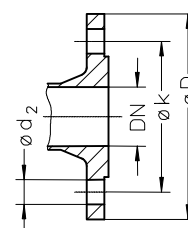
## LPH 45008, LPH 45311, LPH 45316 with motor carrier and with Side-Mounted Liquid Separator



	E-Motor 50 Hz		a [mm]	o <sub>1</sub> * [mm]	Approx. Weight [kg]
	Size	kW			
LPH 45008	100 L	3,0	239	312	142
	112 M	-			3,6
LPH 45311	112 M	4,0	269	333	153
	132 S	-			5,0
LPH 45316	132 S	5,5	339	373	185
	132 M	-			6,8

\* Dimensions dependent upon motor supplier

Flange dimensions according to DIN 2501 PN 10 [mm]		
DN	40	50
k	110	125
D	150	165
Number x d <sub>2</sub>	4 x 18	4 x 18



**Make-up Liquid Consumption** in [m<sup>3</sup>/h] dependent upon suction pressure, speed, drive type and temperature difference.

Suction pressure in [mbar]		33			120			200			400						
Pump Type	Speed [rpm]	KB			FB	KB			FB	KB			FB				
		Temperature Difference [°C]				Temperature Difference [°C]				Temperature Difference [°C]							
		10	5	2		10	5	2		10	5	2		10	5	2	
LPH 45008	1450	0.17	0.28	0.48	0.9	0.17	0.28	0.46	0.8	0.18	0.29	0.46	0.75	0.18	0.28	0.43	0.6
	1750	0.23	0.36	0.56		0.22	0.35	0.53		0.22	0.34	0.51		0.22	0.33	0.46	
LPH 45311	1450	0.19	0.31	0.51	0.9	0.20	0.32	0.50	0.8	0.21	0.33	0.50	0.75	0.21	0.31	0.45	0.6
	1750	0.24	0.38	0.59		0.25	0.38	0.55		0.26	0.38	0.54		0.25	0.36	0.49	
LPH 45316	1450	0.24	0.38	0.61	1.0	0.25	0.40	0.60	0.9	0.27	0.40	0.59	0.85	0.25	0.36	0.49	0.6
	1750	0.30	0.47	0.69		0.31	0.47	0.65		0.32	0.47	0.64		0.30	0.41	0.53	

FB = Total service liquid flow rate on once-through system

KB = Flow of make-up water when combined with partial recirculation liquid at a temperature of 10°C, 5°C, 2°C, warmer than make-up water.

## Product Code – order details

Range + Size	Hydraulic + Bearings	Shaft Seal	Materials	Casing Sealing	Delivery <b>without</b> motor : code of motor connection
	<ul style="list-style-type: none"> <li>•A 1. Hydraulic</li> <li>•B Two greased roller bearings</li> <li>•Z Two greased roller bearings, with motor carrier</li> </ul>	001 Gland Packing AGE Mechanical Seal Type SIHI FK, O-Rings Butadiene rubber AG1 Mechanical Seal Type SIHI FK, O-Rings Viton AFJ Mechanical Seal Type Sterling GNZ, O-Rings Viton AFK Mechanical Seal Type Sterling GNZ, O-Rings Teflon coated (Viton heart)	0A Main parts from cast iron (GG) and impellers in bronze 0B Similar to 0A, but impellers in steel 0K Similar to 0A, but impellers in low alloyed steel SZ Similar to 0A, however impellers and guide discs are in stainless steel 4B Main parts out of stainless steel	1 O-Ring Sealing	LS for IMB5 motor 100L resp. 112M flange Ø 250 MS for IMB5 motor 132S resp. 132M flange Ø 300
45008	AB	001	0A	1	-
LPH 45311		AGE, AFJ	0A, 0B, 0K, SZ		
45316		AG1, AFK	4B		
45008	AZ	AGE, AFJ	0A	1	LS
LPH 45311		AG1, AFK	4B		LS, MS
45316					MS

## Motor Selection

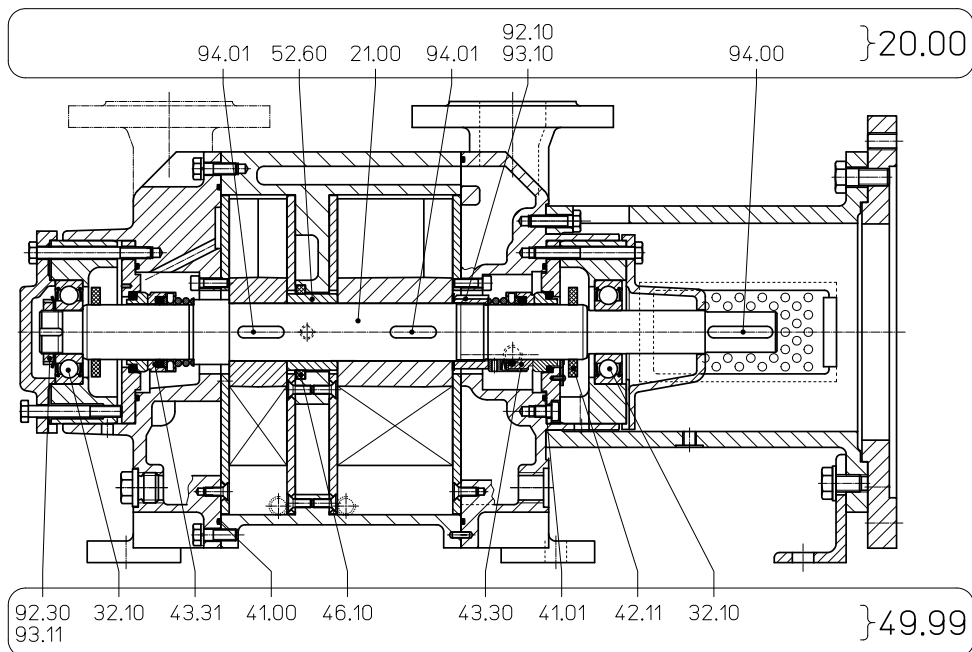
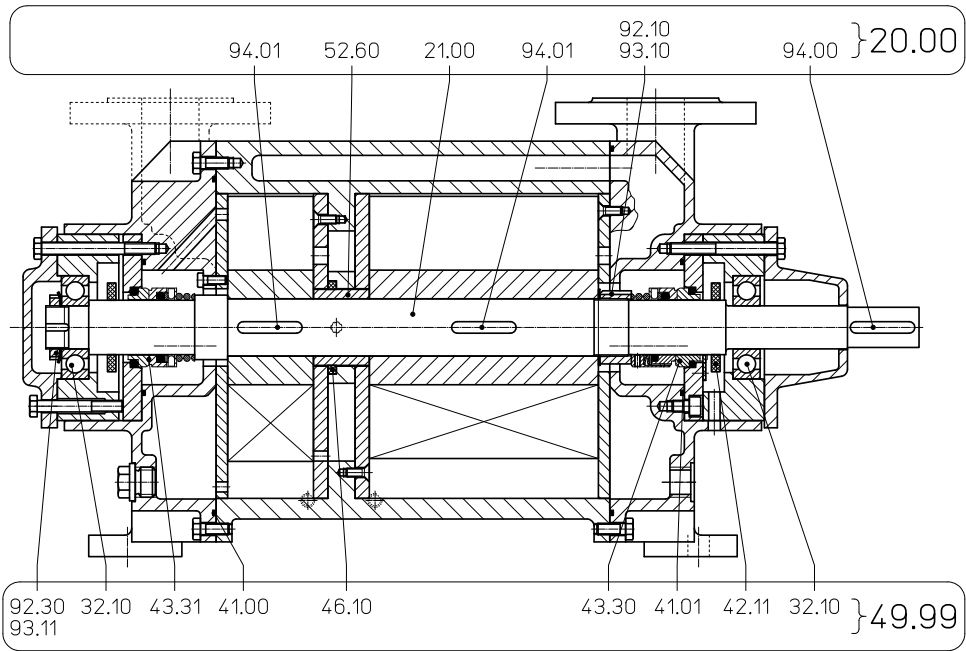
For our products we offer a lot of different motor types.

To identify the right motor please specify frequency, voltage and protection class.

## Example of an Order:

LPHX 45311 AB AGE 0A 1 with 4.0 kW AC motor, 50 Hz, 400V Δ, IP55

Spare Parts Order Number



Material Design 0A				
Group	Spare Parts Kit	LPH 45008	LPH 45311	LPH 45316
20.00	Shaft	65 006 712	65 006 711	65 006 710
49.99	Basic Repair AGE		65 008 221	
49.99	Basic Repair AFJ		65 008 222	

Material Design SZ				
Group	Spare Parts Kit	LPH 45008	LPH 45311	LPH 45316
20.00	Shaft	65 006 712	65 006 711	65 006 710
49.99	Basic Repair AGE		65 008 221	
49.99	Basic Repair AFJ		65 008 222	

Material Design 0B				
Group	Spare Parts Kit	LPH 45008	LPH 45311	LPH 45316
20.00	Shaft	65 006 712	65 006 711	65 006 710
49.99	Basic Repair AGE		65 008 221	
49.99	Basic Repair AFJ		65 008 222	

Material Design 4B				
Group	Spare Parts Kit	LPH 45008	LPH 45311	LPH 45316
20.00	Shaft	65 006 757	65 006 758	65 006 759
49.99	Basic Repair AG1		65 008 223	
49.99	Basic Repair AFK		65 008 224	

## Accessories

Recommended Accessory	Material Execution		LPH 45008	LPH 45311	LPH 45316	
<b>Top Mounted Liquid Separator</b>		Type / Weight	XBa 1040 / 10 kg		XBa 1340 / 14 kg	
Top mounted separator	Steel, galvanised 1.4571	SIHI-Part No.	35 000 388 35 000 389	35 000 408 35 000 409		
Service liquid pipework, standard execution	Steel, galvanised 1.4571	SIHI-Part No.	20 058 985 20 058 993			
Service liquid pipework, thermostatic control 24V	Steel, galvanised +Brass 1.4571 + Brass	SIHI-Part No.	20 059 008 20 048 978			
Cavitation protection pipework	Steel, galvanised 1.4571	SIHI-Part No.	20 040 424 20 040 423			
<b>Side Mounted Liquid Separator</b>		Type / Weight	XBp 0413 / 28 kg			
Side mounted separator	Steel, galvanised 1.4571	SIHI-Part No.	35 000 502 35 000 503			
Service liquid pipework, standard execution	Steel, galvanised 1.4571	SIHI-Part No.	20 058 979 20 058 987	20 058 980 20 058 988	20 058 981 20 058 989	
Service liquid pipework, thermostatic control 24V	Steel, galvanised +Brass 1.4571 + Brass	SIHI-Part No.	20 049 503 20 050 725			
Cavitation protection pipework	Steel, galvanised 1.4571	SIHI-Part No.	20 044 682 20 044 681			
Pressure pipework (bend)	1.0254 1.4571	SIHI-Part No.	35 003 165 35 003 166			
Liquid level indicator	Brass + Plexiglas 1.4571 + Plexiglas	SIHI-Part No.	43 014 911 43 040 384			
<b>Sterling SIHI - Gas Ejector</b> see Technical Catalogue – Gas Ejector						
At service liquid temperature 15 °C		Type / Weight	GPV 4011 / 13 kg	-	GPV 4012 / 20 kg	
At service liquid temperature 30 °C		Type / Weight	GPV 4311 / 12 kg	GPV 4312 / 13 kg	GPV 4313 / 13 kg	
<b>Sterling SIHI - Non Return Ball Valve</b>						
Intermediate flange execution XCk 40	0.6025 +Butadiene Rubber 0.6025 +Teflon 1.4408 +Teflon	SIHI-Part No. Weight	20 072 746 / 2.8 kg 20 072 745 / 2.8 kg 20 029 494 / 5.2 kg			
Flange execution with glass cylinder XCk 406	0.6025 +Butadiene Rubber 0.6025 +Teflon 1.4408 +Teflon	SIHI-Part No. Weight	20 072 835 / 7.0 kg 20 072 836 / 7.0 kg 20 072 834 / 7.0 kg			
<b>Drain Valve</b> XCg 015	Steel 1.4571	SIHI-Part No.	43 014 545 43 014 546			
Double nipple ½"-¾"	Steel, galvanised 1.4571	SIHI-Part No.	43 049 216 43 013 084			
<b>Air Inlet Valve</b>	Brass 1.4408	SIHI-Part No.	43 014 257 + 43 060 102 43 014 271			
<b>Motor</b>						
Motor Standard execution IP 55		Size Power Weight	100 L 3.0 kW 20 kg	112 M 4.0 kW 28 kg	132 S 5.5 kW 45 kg	
Coupling for Motor IP 55 Pump side Motor side		Type / Weight SIHI-Part No.	B 95 / 2.6 kg 43 021 426 43 021 432		B 95 / 2.6 kg 43 021 426 43 021 433	
Coupling guard	Steel	SIHI-Part No.	43 042 248			
Motor in EEx e II T3 execution		Size Power Weight	112 M 3.6 kW 30 kg	132 S 5.0 kW 65 kg	132 M 6.8 kW 80 kg	
Coupling for Motor EEx e II T3 Pump side Motor side		Type / Weight SIHI-Part No.	BDS 103 / 3.1 kg 43 026 564 43 025 940	BDS 103 / 3.1 kg 43 026 564 43 025 941		
Coupling guard	Brass	SIHI-Part No.	43 042 249			
<b>Baseplate</b>	Steel	Type / Weight SIHI-Part No.	S 303 / 36 kg 43 040 635	S 344 / 48 kg 43 040 637		

Designs subject to change without prior notice.

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